

### REMARKS

In the Office Action dated March 23, 2006, the Examiner rejected claims 1-3, 5-12, 14-20, and 22-24 under 35 USC 102(b) as anticipated by Sugama (US Patent Publication 2002/0118907) and rejected claims 4, 13 and 21 as obvious over Sugama and Nakaura (US Patent 5,604,835). In response thereto, the Applicant has amended claims 1 and 18 and cancelled claim 2. Claims 1 and 3-25 remain at issue.

### THE ART REJECTION

Certain claims have been amended to include the subject matter of now cancelled claim 2 which recited that the plurality of optical lenses are formed on the bottom cladding layer. The Examiner rejected claim 2 as anticipated by Sugama. The Applicants disagree. Sugama does not anticipate the subject matter of claim 2.

In the rejection, the Examiner states in the first paragraph of page 4 of the March 23, 2006 Office Action the following: *"Regarding claim 2, Sugama teaches the limitations of the base claim 1. Sugama also teaches that the plurality of optical lenses are formed on the bottom cladding layer (Figure 12, element 2)".* A careful review of Sugama indicates that the Examiner has misconstrued the reference.

The embodiment of Figure 12 is similar in structure as the embodiment shown in Figures 9 and 10 with the exception of the lens. In the embodiments shown in Figures 9 and 10, a single lens 6 is provided over the mirror 5 for each waveguide 3 respectively. See specifically paragraph [0160]. In contrast with the embodiment shown in Figure 12, a single lens 6 spans several mirrors 5 and waveguides 3. See the last sentence of paragraph [0168].

Therefore, contrary to the Examiner's statements, element 2 of Figure 12 in Sugama is: (i) not a lens; or (ii) not formed on a bottom cladding layer. Paragraph [0168] in Sugama explicitly states that element 2 is a cladding layer and that the planer convex lens 4 and the mirror 5 are *"arranged in the single piece of cladding 2"*.

The claims reciting the plurality of optical lenses being formed on the bottom cladding layer and exposed to ambient air are therefore patentably distinct over the Sugama reference.

Other claims of the present invention are directed to a core channel having a curved section and which is sandwiched between a bottom and a top cladding layer. The top cladding is selectively patterned to have at least one curve opening that exposes the curved section of the

underlying core channel to the ambient air. By exposing the curved section of the core channel to ambient air, the radius of the curved section can be made smaller than otherwise possible if the top cladding layer covered the curved section. A review of the Sugama reference indicates that this feature is not taught or suggested.

In formulating the rejection, the Examiner states that the waveguide system of Figures 14 through 16 includes a bottom cladding layer 21, a core channel 23 having a curved section, and a top cladding layer 27 patterned to include a curved opening 16 so the underlying curved section of core channel 23 is exposed to ambient air. A review of the Sugama reference with regard to Figures 14-16 indicates that the Examiner has completely misconstrued the actual teaching of the reference. The cores 23 of Sugama are not covered or exposed to ambient air.

In paragraph [0173] Sugama states that a description of Figure 14 is omitted because it is the same as Figure 13. A detailed discussion of Figure 13 is therefore provided below.

With reference to Figure 13 in paragraph [0170], Sugama describes an optical wiring multi-layer substrate with input optical wires 12 formed in a lower layer and output optical wires formed in an upper layer. In Paragraph [0171], Sugama further teaches that the input wiring 12 and the output wiring 13 are "*linear*" (i.g., not curved) and are "*orthogonal to each other on different layers*". In paragraph [0174], Sugama teaches that an interlayer optical via hole 16 is provided between the input wiring 12 and the output wiring 13 to optically couple the two together. The interlayer optical via hole 16 is illustrated in Figures 15 and 16A-16H of Sugama.

Figure 15 is described by Sugama in paragraphs [0175] through [0177].

In paragraph [0175], Figure 15 is described as a cross-sectional view of an upper waveguide and a lower waveguide. The two waveguides are "orthogonal" (i.e., at right angles or 90 degrees apart) from one another.

In paragraph [0176], both the upper and lower waveguides are each described as composed of three layers, including an under-cladding 22, a core 23, and an over-cladding 24, both formed on a substrate 21.

In paragraph [0177], Sugama describes the optical hole 16 as comprising the grooves 20 each covered with a reflective metal film 25.

Figure 15 specifically shows the path of light through the Sugama waveguide. The arrow (no reference number is provided) clearly shows the light path as follows:

- (i) from the core 23 of the lower waveguide and reflecting upward off the mirrored surface 25 of the bottom groove 20;

(ii) through the substrate 21; and

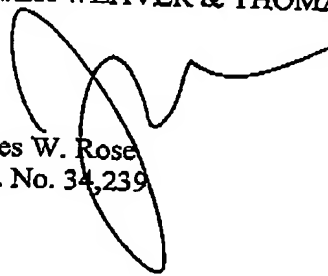
(iii) off the upper reflective surface 25 and into the upper core 23 of the top waveguide.

The waveguide structure of Figure 15 therefore clearly teaches that the optical vias 16 are defined by the reflective surfaces 25 of the upper and lower grooves 20.

Accordingly, in no way does Sugama teach that the cores 23 are: (i) curved. On the contrary, Sugama explicitly teaches that the upper and lower cores 23 (i.e., input wires 12 and output wires 13) are *linear*; or (ii) exposed to ambient air. Sugama specifically teaches that the optical vias 16 are in the optical path between the upper and lower waveguides and are defined by the reflective surfaces 25 of the upper and lower waveguides respectively. Sugama therefore fails to teach or suggest the present invention as claimed in the present application.

Applicant believes that all pending claims have been amended and the case is now in a condition for allowance. The applicants respectfully requests a Notice of Allowance for this application from the Examiner. Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at the telephone number set out below.

Respectfully submitted,  
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